Exhibit 34

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

PC Code: 128931
DP Barcode: 404138, 404806, 405887, 410802, 411382
May 20, 2013

MEMORANDUM

SUBJECT: Addendum to the Environmental Fate and Ecological Risk Assessment for the Section 3 New Use of on Dicamba-Tolerant Soybean

TO: Kathryn Montague, Risk Manager (RM 23)
Daniel Kenny, Branch Chief, Herbicides Branch
Registration Division (7505P)

FROM: Elizabeth Donovan, Biologist
Reuben Baris, Environmental Scientist
Environmental Risk Branch VI
Environmental Fate and Effects Division (7507P)

THRU: Mark Corbin, Branch Chief
Environmental Risk Branch VI
Environmental Fate and Effects Division (7507P)

REVIEWED BY: Charles Peck, Physical Scientist
Faruque Khan, Ph.D., Physical Scientist
Environmental Fate and Effects Division (7507P)

The Environmental Fate and Effects Division (EFED) Ecological Risk Assessment for Dicamba and its Degradate, 3,6-dichlorosalicyclic acid (DCSA), for the Proposed New Use on Dicamba-Tolerant Soybean (MON 87708) (DP Barcode 378444; dated March 8, 2011) did not include complete evaluation of risks to terrestrial non-target organisms exposed to dicamba through spray drift and vapor drift. This analysis was not included because there was incomplete information on the drift and volatility of the diglycolamine salt of dicamba (DGA) relative to the acid as well as a lack of information on the toxicity of vapor phase dicamba (DGA or acid) to terrestrial plants. Without this information EFED was not able to conduct a quantitative risk assessment for plants exposed to dicamba spray drift or vapor drift. Recent data submitted to the Agency by the registrant, Monsanto Company (Monsanto), provided sufficient information to support a more thorough analysis of spray drift and vapor drift exposure to plants. While this additional information does not allow for a full characterization of off-field movement of dicamba, conservative assumptions can be made for vapor emitted from the application site as well as assumptions for spray drift to estimate ecological risk from both of these exposure routes. Available information and additional analyses are presented below.

In addition, as discussed in the Addendum to the Data Evaluation Report on the Toxicity of Clarity 4.0 SL (AI: Dicamba) to Terrestrial Vascular Plants: Vegetative Vigor (MRID 47815102; D411301; dated April 25, 2013), use of the EC_{05} (0.000013 lb a.e./A) is not appropriate for the listed species risk assessment because a NOAEC value of 0.000261 lb a.e./A is available. Based on this information, the terrestrial plant assessment has been updated to reflect the most current endpoints. Additionally, the terrestrial invertebrate assessment has been updated based on changes in Agency policy.

Based on the weight of evidence analysis included in this addendum the dominant route of off-field exposure to non-target terrestrial and aquatic organisms is more likely to be a result of spray drift and runoff than the volatilized mass of dicamba from a treated field. This does not mean that volatility is not a concern; however, spray drift and run-off are more dominant routes of exposure. The first tier estimated distances where effects are predicted for non-target organisms from the treated field (0.5 lb a.e./A) are 210 and 475 feet for the non-listed and listed terrestrial plant endpoints, respectively (410 and 890 ft for the 1.0 lb a.e./A application, non-listed and listed species, respectively). Conclusions are based on the analysis of coarse droplet spectra data from the Spray Drift Task Force (SDTF) and the estimated deposition off field above the non-listed and listed terrestrial plant endpoints. A different 100 ft buffer distance is proposed by Monsanto based on an alternative method for estimating distance to no effect off-field (see analysis below for spray drift analysis). However, there is uncertainty about how specific spray drift reduction strategies (*e.g.,* DRT and nozzle/product specific labeling language) impact the distance of effects off-field. This is largely due to a lack of data.

Additional analyses were conducted with available data and additional submissions provided by Monsanto aimed at refining the initial estimates of buffer distances; however, the following uncertainties persist:

- Product and nozzle specific drift curves are not available.
- The Theoretical Shape Profile (TSP) method study submitted by Monsanto provided a line of evidence about the volatility of dicamba, however it is uncertain how this compares to standard field volatility studies (OCSPP guideline number 835.8100).
- A vapor phase toxicity endpoint is not available for terrestrial plants to compare to the estimates of vapor exposure.

The body of evidence highlight the variability in the available data. Where the distances at the higher, more conservative, end may be overestimating distance off field to no-effect, and the distances at the lower end, less conservative, may be underestimating buffer distances. For the over-the-top 0.5 lb a.e./A application rate, a realistic distance from the application site to where no effects are observed ranges from 100-175 ft (assuming linearity, the 1.0 lb a.e./A rate would presumably yield roughly 2x greater distances). However, based on the weight of evidence for the coarser droplet spectra, and a 0.5 lb a.e./A rate, this distance is 125 ft.* Distances for the 1.0 lb a.e./A rate are roughly 2x the distance estimated for the 0.5 lb a.e./A rate assumptions are linear.

Of paramount importance, product and nozzle specific drift curves based on empirical data are needed to address uncertainties with the distance off-field that effects are estimated for terrestrial plants. These type of data should be consistent with the Agency's Drift Reduction Technology (DRT) program intending to improve the clarity and enforceability of product label use directions and drift restrictions and encourage the use of drift reducing application technologies and best management practices to minimize drift. Results from DRT studies can be incorporated into specific label use directions and drift restrictions that would better inform the spray drift risk assessment and would likely result in smaller estimated buffer distances between the treated field and non-target organisms.

Updates to Conclusions from Previous Terrestrial Plant Assessment

Dicamba exposure to terrestrial and semi-aquatic plants, estimated using the TerrPlant model (version 1.2.2), resulted in RQs that exceeded the listed and non-listed species level of concern (LOC = 1) for dicots in terrestrial areas due to spray drift and in semi-aquatic areas due to runoff and spray drift. RQs for monocots in terrestrial and semi-aquatic areas did not exceed the LOC. The EECs, toxicity endpoints, and resulting RQs for terrestrial and semi-aquatic plants for a single application of dicamba DGA at the maximum label rate for the proposed use on dicamba-tolerant soybeans are presented in **Tables 1-3.**

Table 1. EECs for Terrestrial and Semi-Aquatic Plants Near Dicamba Use on Dicamba-Tolerant Soybeans.

Crop	Single Max. Application Rate (lbs a.e./A)	EECs (lbs a.e./A) Ground Spray		
		Total Loading to Adjacent Dry Areas (sheet runoff + drift)	Total Loading to Semi-Aquatic Areas (Channelized runoff + drift)	Drift EEC
Dicamba-Tolerant Soybeans	1.0	0.06	0.51	0.01

Table 2. Plant survival and growth data used for RQ derivation. Units are in lb a.e./A.

	Seedling Emergence		Vegetative Vigor	
Plant type	EC_{25}	NOAEC	EC_{25}	NOAEC
Monocot	1.68	0.64	0.427	0.137
Dicot	0.123	0.0673	0.000513	0.000261

Table 3. RQ values for plants in dry and semi-aquatic areas exposed to Diglycolamine Salt (DGA) through runoff and/or spray drift.*

* Label language for the proposed Monsanto product includes application must use flat fan nozzles with "very-coarse to ultra-coarse" droplet distribution.

Plant Type	Listed Status	Dry	Semi-Aquatic	Spray Drift
Monocot	non-listed	<0.1	0.30	<0.1
Monocot	listed	<0.1	0.80	<0.1
Dicot	non-listed	0.49	**4.15**	**19.49**
Dicot	listed	0.89	**7.58**	**38.31**
*If RQ > 1.0, the LOC is exceeded, resulting in potential for risk to that plant group.				

Updates to Conclusions from Previous Terrestrial Invertebrate Assessment

T-REX is used to calculate EECs for terrestrial invertebrates exposed to the DGA salt of dicamba from the proposed use on dicamba-tolerant soy. Terrestrial EECs for the DGA were derived for the proposed use based on the maximum labeled application rate (*i.e*, 1.0 lb a.e./A application followed by two 0.5 lb a.e./A applications at 6 day intervals). The foliar dissipation half-life of 35 days is used based on the T-REX user guide. The dietary-based EEC calculated by T-REX for arthropods (units of µg a.e./g of bee, or ppm) are used to estimate exposure to terrestrial invertebrates. The EECs are compared to the adjusted acute contact toxicity data for bees in order to derive RQs. For dicamba, the available acute contact toxicity endpoint for bees exposed to dicamba (in units of µg a.e./bee), is converted to µg a.e.,/g (of bee) by multiplying 1 bee by 0.128 g (the average weight of an adult honey bee). In this case, the acute contact LD_{50} is > 91 µg a.e./bee for the honey bee (*Apis mellifera*; MRID 00036935), which results in an adjusted toxicity value of >711 µg a.e./g of bee.

While RQs cannot be calculated for terrestrial invertebrates because of the non-definitive toxicity endpoint, EECs generated for the arthropod can be compared to the available toxicity data to determine whether there is potential for risk. The arthropod EEC for dicamba is 162.85 µg a.e./g of bee, which represents 23% of the highest dose tested in the acute contact study. To further put potential exposures in context, the highest concentration tested in the available acute contact study, which did not result in mortality or signs of overt toxicity, is already below the Agency's interim LOC (0.4). Based on this information, the risks to listed and non-listed terrestrial invertebrates from the proposed use of dicamba is low.

Additional Analyses

Field Studies

The registrant submitted additional information in support of their request for registration of the DGA salt for use on Dicamba-tolerant soybean (MON 87708).

The first study (MRID 48892301) measured the effects of small amounts of MON 54140, a technical end use product with the DGA salt, on soybean vegetative growth and yield endpoints under field conditions. Soybean was selected as the test species in part because available lab data suggest it is highly sensitive to dicamba during vegetative growth stages with NOAEC and EC_{25} values of 0.000261 and 0.000513 lb a.e./A, respectively (MRID 47815102; Acceptable). During the study, MON 54140 was applied to plants at three field sites within the major soybean growing region (AR1 located in Proctor, Arkansas, IL1 located in Carlyle, IL, and IL2 located in Wyoming, IL). Six spray application rates plus a control were used and plant responses were measured weekly for nine weeks. The study authors calculated EC_x values for each week of measurement and determined that plant effects peaked three weeks after pesticide application. The most sensitive endpoint across the three sites was plant height, with the lowest EC_{25} and associated NOAEC values of 0.0008 lb a.e./A and less than 0.0006 lb a.e./A, respectively. Results of this study support the contention that soybean in the field showed similar sensitivity to dicamba as soybean in the lab and can thus be used as a field bioassay.

The second study (MRID 48876001) addressed the potential for off-site movement of the DGA salt under field conditions using non-tolerant soybean as a bioassay. The study was conducted under varying field conditions to represent a range of application scenarios possible for the proposed new use on dicamba tolerant soybean. MON 54140 was applied at a rate of 0.5 lb a.e./A to the eight field sites using TeeJet AIXR 11004, TTI 11004, or AIC 11003 nozzles. Applications were made perpendicular to the prevailing wind direction to maximize the potential for spray drift. Plant heights were measured at regular intervals up to 328 ft downwind of the spray areas depending on the size and shape of the experimental field. There were no controls in this study so statistic could not be verified using standard EFED approaches. Instead, mean no-effect distances were determined by fitting non-linear mixed effects model to the available plant height data and calculating an effective distance. For those transects that did not fit the non-linear mixed effects model, mean no-effect distances were visually determined from scatterplots for each transect. The overall mean no-effect distance based on reduction in plant height was less than 90 ft for all trials. This study forms the basis for the registrant's recommendation of a 100 ft buffer for 0.5 lb a.e./A applications of the DGA salt to dicamba tolerant soybean. The study was reviewed in conjunction with the Statistics Technical Team (STT) and the following uncertainties were noted:

- Control plants were not used in this study, necessitating use of non-standard statistical methods.
- Outliers in the data, defined as "an observation at a distance along a transect at which the maximum plant height was greater than two times the minimum plant height", were removed from the analysis to calculate no-effect distances. These outliers may represent sensitive plants and may have an impact on the calculated no-effect distances.
- The analysis used PROC NLMIXED in SAS to fit the nonlinear regression model for each transect rather than running a single nonlinear mixed effects model accounting for all of the effects of the study (e.g., site, transect, nozzle type), which would better assess potential sources of variability.
- The analysis reports the mean no effect distance for each site and nozzle combination instead of the upper 90^{th} confidence interval, which would better represent possible exposures.

The STT expressed reservations about the overall study design (e.g., the lack of control data) and were uncertain whether the results are meaningful given the amount of variability inherent in terrestrial plant field studies. It is the team's opinion that results of the study should be interpreted with caution.

Drift Analysis

An analysis of the Coarse Droplet data from Spray Drift Task Force[†] (SDTF) showed that exceedances of the non-listed terrestrial plant endpoint could occur up to 210 ft and 410 ft from the edge of field using max single rate and max in-crop app rate of 0.5 and 1.0 a.e./A, respectively. These distances were calculated using an approved method for estimating spray drift for Agency risk assessment where the non-listed EC_{25} vegetative vigor endpoint for soybeans was used (0.000513 lbs a.e./A, MRID 47815102) as well as the 90th percentile of the coarse droplet size distribution (DSD) for spray drift. There was no exceedance for monocot plant species, only dicot plant species. For listed plants, there are exceedances up to 475 ft from the edge of field for the 0.5 lb a.e./A maximum single application rate, and 890 ft from the edge of field for the 1.0 lb a.e./A rate. Calculations of distances of effect are based on the vegetative vigor endpoint for soybean (NOAEC = 0.000261 lb a.e./A) (**Table 4)**. This analysis was completed using the 90th percentile of the coarse DSD from the empirical data that forms the basis for the AgDRIFT model. The low-boom, coarse DSD was extracted and each of the 4 swaths were plotted. For each run, values were ranked and the 90th percentile was selected for this analysis. The 90th percentile deposition with distance was plotted and estimated distances where off field effect are likely to be minimized were calculated based on the fraction of droplet deposition.

Additional characterization of the potential spray drift using the 50th percentile deposition curve would result in buffer distances of approximately 125 and 250 ft for the 0.5 lb a.e./A rate and the non-listed and the listed endpoint, respectively (**Table 5**). In order to further refine these modeled distances where effects off field are minimized, product- and nozzle-specific drift curves are needed.

Table 4. Estimated distance off field effects for non-target species observed based on Coarse DSD from 90th %-tile SDTF data (4-swaths).

Vegetative Vigor Endpoint	**Application Rate**	
	0.5 lbs a.e./A (max single app in crop)	1.0 lbs a.e./A (total in crop)
Dicot, soy (non-listed, EC_{25} = 0.000513 lbs a.e./A)	210 ft	410 ft
Dicot, soy (listed, NOAEC = 0.000261 lbs a.e./A)	475 ft	890 ft

Table 5. Estimated distance off field effects for non-target species observed based on Coarse DSD from 50th %-tile* SDTF data (4-swaths).

Vegetative Vigor Endpoint	**Application Rate**	
	0.5 lbs a.e./A (max single app in crop)	1.0 lbs a.e./A (total in crop)
Dicot, soy (non-listed, EC_{25} = 0.000513 lbs a.e./A)	125 ft	250 ft
Dicot, soy (listed, NOAEC = 0.000261 lbs a.e./A)	250 ft	425 ft

* Note: 50th%-tile DSD is a non-standard approach that is not typically used for spray drift modeling as it may under predict potential driftable fines.

Characterization of Spray Drift Analysis

† Teske et al., 2001

The Agency continues to reevaluate approaches to estimating spray drift off-field from the treatment site. In the case of this DGA assessment, a weight of evidence approach was used to refine standard AgDRIFT estimates of spray drift to calculate distance to no-effect for listed and non-listed dicot plant species. Appendix A includes a tabulation of the available data (submissions) and individual model estimates of buffer distances, which are described below. The buffer distance based on the analysis of the weight of evidence for the 0.5 lb a.e./A application rate is 125 ft.‡ However, product and nozzle-specific drift curves based on empirical data that are incorporated into specific label use directions and buffer restrictions and would better inform the spray drift risk assessment and would likely result in smaller buffer distances between the treated field and non-target organisms.

EFED explored several refinements to the standard conservative assumptions built into standard modeling approaches to characterize potential off-field exposure from spray drift. First, AgDRIFT SDTF data, which contain empirical data based on 4 swaths, were compared to modeled data based on 1 swath. The result at the 90th percentile DSD for the 0.5 lb a.e./A is 175 ft and 300 ft for the 1.0 lb a.e./A from the treated field to no-effect for listed species , compared to 475 and 890 ft discussed above using a 4 swath analysis (a 300 ft and almost 600 ft reduction if a single swath analysis is used). This approach accounts for the impact of a single pass within the field and the resulting estimated drift off field, however a single swath scenario is not realistic given the application practices in soy agriculture.

Second, a crude approach looks at all of the available data and averages all distances together, equaling approximately 175 ft as the distance beyond which effects to listed plant species are not expected. Extracting just the coarse, extra-coarse, and ultra-coarse values from this table the average is reduced to 124 ft (which is rounded to 125 ft). Additionally, examining the extra-coarse and ultra-coarse data points exclusively in the weight of evidence result in an estimated average distance of 107 ft. All of the methods for estimating spray drift and distances to no-effect use different assumptions and thus aggregating them together should be done with caution. However, this analysis highlights the range in potential variability (62-475 ft) when estimating the distance off field below the where deposition is less than the NOAEC. Again to address the identified uncertainties a study that evaluates the product and nozzle specific recommendations according to the American Society of Biological and Agricultural Engineers (ASABE) DSD could be submitted to inform the distance to no-effect, in all likelihood reducing the potential buffer distance.

Part of the weight of evidence approach includes additional study submissions by Monsanto. These studies include an independent analyses of spray drift using the AgDRIFT Model and field investigations titled, *Summary of Investigations of the Potential for Off-Site Movement through the Air of the Herbicide MON 54140 Following Ground Applications* (MRID 48876001) and *Concordance of MON 54140 Buffer Distances Determined using Field Spray Drift Studies and AgDRIFT* (MRID 49022404). The purpose of these submissions was to present the results of eight field trials in the US and Argentina, designed to evaluate off-site movement of dicamba from fields treated with the DGA formulation and compare those results to AgDRIFT modeling.

‡ Modeled estimates for 1.0 lb a.e./A are approximately 2x the 0.5 lb a.e./A rate, therefore it is reasonable to assume the weight of evidence distance is 250 ft.

The trials were conducted under varying field conditions to represent a range of application scenarios including applications with and without a glyphosate formulation. Spray solutions were applied using either TeeJet AIXR 11004, TTI 11004, or AIC 11003 nozzles at nominal dicamba rates of 0.5 lb a.e./A to plots of soybeans or corn contained within larger soybean fields. In the study submitted by Monsanto (MRID 48876001) results of field trials were compared with AgDRIFT model runs using the 50^{th}%-tile DSD with an incorporation of an adjustment to the driftable fines fraction obtained from wind tunnel test. Based on results from this analysis, combined with the submitted field data, Monsanto concluded that a distance of approximately 100 ft would be needed to reduce potential effects to non-target sensitive plants. Note Monsanto also completed a comparison of AgDRIFT model runs using the 90^{th}%-tile DSD resulting in an average of 40 ft greater no-effect distance for the 90^{th}%-tile DSD runs.

To provide additional support for the 100 ft buffer recommended by the various field trials, Monsanto submitted an analysis using the PMRA Buffer Zone Workbook and the underlying data supporting the tool (D405887). A review of these data were completed and were included in the weight of evidence approach (USEPA, 2013).

The Agency's conclusions and approaches to estimating buffer distances are different than Monsanto's. Ultimately the Agency disagrees with the application of the correction factor for driftable fines based on wind tunnel data. The Agency's analysis of the driftable fraction (% <150µm) that underlies the AgDRIFT model is 9.5% compared to the 15.63% and 14.64% used by Monsanto to calculate the ratio of driftable fines for the MON54140 and the MON54140+MON79789 mixes, respectively. By correcting the driftable fractions to match the driftable fines used in AgDRIFT results in greater no-effect distances. Further, the assumption of driftable ratio correction is not consistent for other DSD spectra (*e.g.,* very fine to fines). If the assumptions for coarser droplet spectra (*i.e.,* lower driftable fraction) were consistent across all spectra, the correction approach to the application rate in AgDRIFT for driftable fraction would be a reliable method; however, this is not the case. Therefore the Agency used the Coarse DSD analysis as a refinement to the standard AgDRIFT modeling to estimate no-effect distances.

At the first refinement level, the difference between the Monsanto estimate and the Agency estimate of no-effect distances resulting from drift at the 0.5 lb a.e./A rate is approximately 100 ft for non-listed (100 ft vs 200 ft) and 375 ft for listed species (100 ft vs 475 ft).

The body of evidence highlight the variability in the available data. Where the distances at the higher, more conservative, end may be overestimating distance off field to no-effect, and the distances at the lower end, less conservative, may be underestimating buffer distances. A realistic distance from the application site to where no effects are observed ranges from 100-175 ft. Based on the weight of evidence for the coarser droplet spectra, this distance is 125 ft.[§]

Again, it is important to note that product and nozzle specific drift curves based on empirical data that are incorporated into specific label use directions would better inform the spray drift risk assessment and would likely result in smaller buffer distances between the treated field and non-target organisms.

[§] Label language for the proposed Monsanto product includes application must use flat fan nozzles with "very-coarse to ultra-coarse" droplet distribution.

Vapor Analysis

Additional analyses were completed to determine the potential contribution that vapor phase drift would impact the terrestrial risk assessment. The analyses are based on the potential for a semi-volatile compound such as dicamba acid to volatilize from the treated site and drift off-field and redeposit in sensitive, non-target areas and cause an effect. Data were gathered for dicamba acid, dicamba DGA, and dicamba DMA (in the case of volatile flux data). This was done so that the Agency is able to provide multiple lines of evidence to support risk conclusions. Based on these multiple lines of evidence and characterization of the potential for off-field drift due to volatilized material, the Agency concluded that the dominant route of off-field exposure is more likely to be a result of spray drift and runoff based on the analysis below. However there are associated uncertainties regarding the amount of dicamba that volatilizes from a field treated with the dicamba DGA salt formulation. Uncertainties associated with converting air concentrations to a plant deposition would be greatly reduced by the submission of a terrestrial plant vapor phase toxicity end point that measures air exposure concentrations. Without these data the Agency used a number of tools to estimate exposure and convert the vapor phase air concentration to a deposition value to calculate risk to sensitive non-target plants.

As part of the multiple lines of evidence approach, multiple screening-level tools (models and data) were used to characterize and support the Agency's conclusions. The screening tool used for characterization of non-target plant risk from volatile mass utilizes physical and chemical properties to predict flux based on the work by Woodrow *et al.* (1997) and a model developed by the Office of Solid waste and Emergency Response that estimates vapor phase exposure to non-target plants. Woodrow *et al.* (1997) and Woodrow *et al.* (2001) developed a linear regression between the natural logarithm of a chemical's physical and chemical properties to the natural logarithm of the amount of chemical emitted from the soil or foliar surface of a plant. However, like all linear relationships, half of the emissions were underestimated when compared to the measured values used to derive the relationship. For the purposes of characterizing volatile drift EFED used the data provided in the Woodrow papers to estimate the 90th percentile upper confidence limit around the slope and intercept so that 90% of the estimated flux rates would exceed the measured values, *i.e.,* a conservative estimate of flux. The estimated flux along with the AERSCREEN[**] model estimates of air concentrations at different distances from a treated field can be calculated, however EFED applied the air concentration to calculate an approximation of deposition in order to estimate what the air concentration would need to be at the edge of the treated field in order to cause an effect (see discussion below). The equation below is a modification of the Woodrow *et al.* (1997) equation based on a series of field trials for volatile and semi-volatile compounds used to estimate the flux from a field for foliar applied compounds.

Modified Woodrow equation for Plants:

$$flux = e^{(0.8268\ln(VP)+12.081} \div 3600$$

Where:

[**] http://www.epa.gov/ttn/scram/dispersion_prefrec.htm

VP = vapor pressure in Pa
$flux$ = mass of vapor emitted from the field per unit area per second ($\mu g/m^2 \cdot s^{-1}$)

$flux = 0.566\ \mu g/m^2 \cdot s^{-1}$

In order to estimate the amount of mass potentially drifted as vapor from the field off-site, EFED adapted the Office of Solid waste and Emergency Response USEPA (2005) tool for estimating vapor phase exposure to non-target plants to develop an aerial vapor transfer concentration from the air concentration; termed Aboveground Product Concentration Due to Air-to-Plant Transfer (equation 5-18 of USEPA, 2005). Conceptually the plant concentration (deposition) is calculated from the aboveground produce concentration do to air-to-plant transfer (vapor transfer). The air-to-plant transfer was developed to determine the exposure of plants from point source contaminant release sites that were in the vapor phase. This equation was adapted, and used with the inhalation screening tool (AERSCREEN) to determine the air concentration at the edge of field.

$$Pv = Q \cdot Fv \cdot \frac{Cyv \cdot Bv\text{ag} \cdot VGag}{Pa}$$

Where:
Pv = Concentration of compound of potential concern (COPC) in the plant resulting from air-to-plant transfer (µg COPC/g DW)[††]
Q = COPC emission rate (g/s) (assumed to be 0.1833 g/s)[‡‡]
F_v = Fraction of COPC air concentration in vapor phase (unitless) (conservatively assume 1 meaning 100% of compound in vapor phase)
Cyv = Unitized yearly average air concentration from vapor phase ($\mu g\text{-}s/g\text{-}m^3$)
Bv_{ag} = COPC air-to-plant biotransfer factor (unitless)[§§]
VG_{ag} = Empirical corrector factor for aboveground produce (assumed 1 for compounds with Log_{kow} <4)
ρ_a = Density of air (g/m^3) = 1,200 g/m^3

The air concentration determined using AERSCREEN (C_{yv}) was used as an input to the OSWER model. The resulting deposition (Pv) was compared to the soybean EC_{25}, converted to air-to-plant DW concentrations assuming one ton of grass (dry weight) per acre using equations A-2-19 and A-2-20 (USEPA, 2005, appendix A). Based on this calculation the Agency concludes that the resulting deposition at the edge of field from volatile drift of dicamba is less than the EC_{25}. In order to exceed the EC_{25} at the edge of field (*i.e.,* the air concentration results in a deposition greater than 0.0005 lb a.i./A) the air concentration (Cyv) would have to be greater than 721 $\mu g/m^3$. These comparisons of the air concentration values calculated from the OSWER tool to the air concentration estimated from AERSCREEN[***] show that with a calculated flux rate of 0.566 $\mu g/m^2 \cdot s^{-1}$ using the modified Woodrow equation (see above) the maximum 1-hour average

[††] For the purposes of a screening model, EC_{25} plant deposition is effectively converted to air-to-plant vapor dry weight concentration assuming one ton of grass (dry weight) per acre (USEPA, 2005; Appendix A, equations A-2-19 & A-2-20).
[‡‡] Converting calculated flux rate from modified Woodrow et al. equation for an 80 acre field.
[§§] Based on correlation of Log_{kow} and HLC (A-2-20 of USEPA, 2005).
[***] Assumptions of flux, application rate,…etc

concentration from AERSCREEN at the edge of the field is 283 ug/m^3 less than the air concentration required to exceed the EC_{25} (as predicted by the OSWER tool) but within the same order of magnitude.

Similarly, the volatile flux data (Theoretical Profile Shape (TPS) method) submitted by Monsanto in March, 2013 (MRID 49022501) provided a 6 hour average flux rate of 0.0004 $\mu g/m^2 \cdot s^{-1}$, greater than 4 orders of magnitude lower than the Woodrow et al estimated flux rate. The air concentration and resulting deposition rate is directly proportional to the flux rate. Therefore since there is uncertainty about what the actual flux rate is, this value can be used as a lower bound estimate of flux. Using the lower bound estimate of flux from the treated field would result in low exposure concern off-field due to volatile drift.

The last screening-level tool that was used to estimate off-field exposure from volatile drift is the AERSCREEN model using the AERMOD deposition algorithm. Similar to the AERSCREEN Tier I analysis above, the air concentration at the edge of the field is approximately 283 ug/m^3 however using the AERMOD deposition algorithm the distance off field where no effect would be observed would be 1500m (*i.e.,* the distance where the deposition value is less than the EC_{25}). These estimates are based on the estimated flux using the Woodrow *et al.* equation as the upper bound. The lower bound TPS flux value results in no exceedance of the EC_{25} at the edge of the field.

Uncertainties associated with converting air concentrations to a plant deposition would be greatly reduced by the submission of a terrestrial plant vapor phase toxicity end point that measures air exposure concentrations.

Based on this multiple lines of evidence approach, the primary route of off-field exposure is more likely to be a result of spray drift and runoff. However, there are uncertainties associated with the analysis that would better clarify the potential for vapor phase exposure to dicamba.

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Appendix A. Tabulated Estimates by Method for Distances to No-Effect

Study/Analyses	Method	# Swaths	DSD	Distance (ft) 0.5 lb ae/A (non-listed)	Distance (ft) 0.5 lb ae/A (listed)	Source	Comments
SDTF (Coarse)	90th%	4	C	210	475	EPA	Standard EFED approach for drift modeling outside of default assumptions (4-20 swaths, 90th %-tile distribution).
SDTF (Coarse)	50th%	4	C	125	250	EPA	
SDTF (Coarse)	90th%	1	C	85	175	EPA	
SDTF (Coarse)	50th%	1	C	--	--	EPA	
Field + AgDRIFT	50th%	4	VC/UC	100	100	Monsanto	Monsanto proposed approach in MRID 49022404
Field + AgDRIFT	90th%	4	VC/UC	140	140	Monsanto	
Plant height (NOAEC)	--	--	VC/UC	90	90	Monsanto	Monsanto analysis included in MRID 48876001
AgDrift + PMRA EAD model	--	--	VC/UC	175	175	Monsanto	--
SDTF (Malathion only) VC	--	--	VC/UC	81	81	Monsanto	Note: the only subset of data that contained vc/coarse DSD. Log-Log transformation.
Field (Clarity)	--	3 (120 ft)	UC	62	62	BASF/Monsanto	Field studies (provided in power point presentation – Dec. 17, 2013)
Field (Engenia)	--	3 (120 ft)	XC	106	106	BASF/Monsanto	Field studies (provided in power point presentation – Dec. 17, 2013)
CLA data	Based on fit curves and ln-ln transformed supporting data	1	VC/Low boom	87	87	EPA	50th%-tile
		1	VC/Low boom	92	92	EPA	90th%-tile*
		4	VC/Low boom	230	230	EPA	90th%-tile *
		1	C-VC/High Boom	116	116	EPA	90th%-tile*
		4	C-VC/High Boom	210	210	EPA	90th%-tile*
		20	C-VC/High Boom	375	375	EPA	90th%-tile
			Ave. (all)	**142.75**	**172.75**		All DSD
			Ave.(coarse)	**124.08**	**124.08**		DSD≥VC
			Ave. (xc)	**107.71**	**107.71**		DSD≥XC

*Note: no difference in ln-ln vs curve fit estimates.